

AD _____

Award Number: W81XWH-08-2-0040

TITLE: Post-Traumatic Stress Disorder and Pain Comorbidity in Veterans

PRINCIPAL INVESTIGATOR: Erin E. Krebs, M.D., MPH

CONTRACTING ORGANIZATION: Indiana University
Indianapolis, IN 46202

REPORT DATE: August 2011

TYPE OF REPORT: Final Addendum

PREPARED FOR: U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

DISTRIBUTION STATEMENT: Approved for Public Release;
Distribution Unlimited

The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision unless so designated by other documentation.

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.					
1. REPORT DATE August 2011		2. REPORT TYPE Final Addendum		3. DATES COVERED 1 July 2008 – 31 July 2011	
4. TITLE AND SUBTITLE Post-Traumatic Stress Disorder and Pain Comorbidity in Veterans				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER W81XWH-08-2-0040	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Erin E. Krebs E-Mail: krebse@iupui.edu				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Indiana University Indianapolis, IN 46202				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Medical Research and Materiel Command Fort Detrick, Maryland 21702-5012				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for Public Release; Distribution Unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT Post-traumatic stress disorder (PTSD) is prevalent and under-recognized in VA primary care and commonly co-occurs with chronic pain. Our primary aim was to analyze existing clinical and administrative data in Veterans Integrated Service Network (VISN) 11 to determine whether the presence of pain affects diagnosis and treatment of PTSD among VA patients who have a positive PTSD screening test. We identified 4244 patients who had a positive PTSD screen between January 1, 2001 and January 1, 2007. The mean patient age was 50.4 and 91.9% were male. Half of the cohort had a concurrent pain diagnosis (n=2104). Those with pain were slightly younger (48.8 vs. 52.0 years, p<0.001), more likely to have depression (33.4% vs. 29.4%, p=0.005), and less likely to have medical comorbidity (p<0.001) than those without coexisting pain. In the year following their positive PTSD screen, 56.4% of patients received a mental health visit and 27.7% received a diagnosis of PTSD. After controlling for baseline characteristics, patients with coexisting pain were less likely to have a follow-up mental health visit (HR 0.889, 95% CI 0.821, 0.962) than those without pain. The groups did not differ in the rate of PTSD diagnosis (HR 0.968, 95% CI 0.866, 1.082).					
15. SUBJECT TERMS Pain, Post-traumatic stress disorders, veterans					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			USAMRMC
U	U	U	UU	F€	19b. TELEPHONE NUMBER (include area code)

Table of Contents

	<u>Page</u>
Introduction.....	4
Body.....	4
Key Research Accomplishments.....	6
Reportable Outcomes.....	6
Conclusion.....	6
References.....	7
Supporting Data.....	8
Appendix.....	10

INTRODUCTION

Post-traumatic stress disorder (PTSD) and chronic pain commonly co-occur among veterans.(1-3) The VA has implemented routine PTSD screening because PTSD is both prevalent and under-recognized in VA primary care. For this screening initiative to be effective, primary care providers must act on positive PTSD screening tests by referring patients for further evaluation or therapy. Previous research has shown that, when depression and pain co-occur, primary care providers are less likely to diagnose and treat depression appropriately.(4-5) Whether comorbid pain has similar negative effects on the diagnosis and treatment of PTSD is unknown. Our primary aim was to analyze existing clinical and administrative data in Veterans Integrated Service Network (VISN) 11 to determine whether the presence of pain affects diagnosis and treatment of PTSD among VA patients who have a positive PTSD screening test. A secondary aim was to assess the effects of PTSD/pain comorbidity on utilization of mental health, primary care, and pain-related health services.

BODY

The study cohort includes patients within Veterans Integrated Service Network (VISN) 11 who were screened for PTSD between Jan 1, 2001 and Jan 1, 2007. Outcomes that occurred up to January 1, 2008 were analyzed and all patients were required to have at least one year of available follow-up.

Aim 1 methods

Aim 1: To determine whether the presence of pain affects diagnosis and treatment of PTSD among VA patients who have a positive PTSD screening test.

The Aim 1 cohort includes patients with a positive PC-PTSD screen (≥ 3 items positive) and no preexisting PTSD diagnosis (assessed by ICD-9 code. Subjects were excluded from this analysis if they did not have had a primary care visit within a month of the positive screening test. The primary independent variable was the presence of coexisting pain. Patients with a pain diagnosis in the year prior to the PTSD screen were considered to have coexisting pain. We used ICD-9 diagnostic codes for headache (346.xx, 307.81, 784.0, 62.72, 339.xx), back pain (720.xx - 724.xx), arthritis and joint pain (710.xx - 719.xx, 725.xx-739.9x), and nonspecific pain conditions (780.96, 307.8, 307.89, 338.xx), which account for the vast majority of chronic pain diagnoses among veterans.

We compared characteristics of patients with and without coexisting pain using chi-square and t-tests for categorical and continuous variables, respectively. We then used longitudinal models to evaluate the association between coexisting pain and PTSD screening outcomes over time. The main outcomes were time to mental health visit and time to PTSD diagnosis. Separate Cox proportional hazards regression models were used to determine the effect of comorbid pain on each outcome. Models also controlled for site, age, gender, mental health visit in the previous year, and diagnosis of depression, alcohol disorder, and drug disorder in the previous year. Race was not included as a covariate because it was missing for more than half of the sample.

Aim 1 results

The Aim 1 cohort included 4244 patients who had a positive PTSD screen between January 1, 2001 and January 1, 2007. The mean patient age was 50.4 and 91.9% were male. Race data were missing on 53.3% of cohort members. Half of the cohort had a concurrent pain diagnosis and 38.6% had a current analgesic prescription (Table 1). Patients with a pain diagnosis were slightly younger (48.8 vs. 52.0 years old, $p<0.001$) and more often had a depression diagnosis (33.4% vs. 29.4%, $p=0.005$) (Table 2).

Mental health visit

Overall, the median time to a mental health visit was 5.7 months (95% CI 4.6 months, 6.9 months), with 56% having a mental health visit in the year after the positive PTSD screening result. Table 3 shows the number of patients with a mental health visit at 3, 6, 9, and 12 months after the positive PTSD screening test. Patients with coexisting pain had a lower rate of mental health visits than those without pain (Table 4; HR 0.889, 95% CI 0.821, 0.962).

PTSD diagnosis

During the study follow-up period, 1280 (30%) patients who had a positive PTSD screen received a PTSD diagnosis. Table 3 shows the number of patients with a mental health visit at 3, 6, 9, and 12 months after the positive PTSD screening test. For those who received a PTSD diagnosis, the median time to diagnosis was 12.7 months. Patients with and without coexisting pain did not differ in PTSD diagnosis rates (HR 0.968, 95% CI 0.866, 1.082).

Relationship between mental health visits and PTSD diagnosis

Patients who had a mental health visit after their positive PTSD screen were more likely than those without a mental health visit to receive a diagnosis of PTSD (HR=1.388, 95% CI 1.232, 1.563). Among those who received a PTSD diagnosis, 780 (59.4%) received it from a mental health clinician.

Aim 2

To evaluate the effects of PTSD/pain comorbidity on utilization of mental health, primary care, and pain-related health services.

The Aim 2 cohort includes all patients in VISN-11 who had symptoms of PTSD, pain, or both PTSD and pain during the study period ($n=41,177$). PTSD was defined as a positive PC-PTSD screen (≥ 3 items positive) or PTSD diagnosis (ICD-9); pain was defined as presence of a pain ICD-9 code (as described above). All patients were required to have at least one year of available follow-up. Patients were evaluated in three groups: 1) PTSD only; 2) pain only; 3) PTSD and pain. Characteristics of patients with coexisting PTSD and pain were compared with those of patients with PTSD alone or pain alone, using chi-square and t-tests for categorical and continuous variables, respectively. We are using regression models to compare the following utilization outcomes among the three groups: primary care visits, mental health visits, hospitalizations, and medication use (opioids, non-opioid analgesics, benzodiazepines, antidepressants, other psychotropic medications). Analysis for this second aim is ongoing.

KEY RESEARCH ACCOMPLISHMENTS

- Data extracted from local VISTA databases into data warehouse
- Retrospective cohorts for Aim 1 and Aim 2 constructed
- Data analysis for Aim 1 completed
- Data analysis for Aim 2 nearing completion
- Abstract prepared for submission to VA Health Services Research and Development National Meeting (to be held February 2012)
- Manuscripts (2) in preparation

REPORTABLE OUTCOMES

- Abstract to be submitted for VA Health Services Research and Development National Meeting (to be held February 2012)
- Manuscripts (2) in progress

CONCLUSION

Among VA primary care patients with positive PTSD screening results, we found that those with coexisting pain were less likely to have follow-up visits in mental health than those who did not have a coexisting pain condition. We found no difference in the rate of PTSD diagnosis between patients with and without coexisting pain. Prospective research is indicated to understand the reasons for these findings and to develop interventions to improve follow-up of positive PTSD screening tests in primary care.

REFERENCES

- (1) Magruder KM, Frueh BC, Knapp RG et al. Prevalence of posttraumatic stress disorder in Veterans Affairs primary care clinics. *Gen Hosp Psychiatry*. 2005;27:169-179.
- (2) Beckham JC, Crawford AL, Feldman ME et al. Chronic posttraumatic stress disorder and chronic pain in Vietnam combat veterans. *J Psychosom Res*. 1997;43:379-389.
- (3) Shipherd JC, Keyes M, Jovanovic T et al. Veterans seeking treatment for posttraumatic stress disorder: What about comorbid chronic pain? *J Rehabil Res Dev*. 2007;44:153-165.
- (4) Otis JD, Keane TM, Kerns RD. An examination of the relationship between chronic pain and post-traumatic stress disorder. *J Rehabil Res Dev*. 2003;40:397-405.
- (5) Bair MJ, Robinson RL, Katon W, Kroenke K. Depression and pain comorbidity: a literature review. *Arch Intern Med*. 2003;163:2433-45.

SUPPORTING DATA

Table 1: Baseline characteristics of patients who screened positive for PTSD

Characteristic	(n=4244)
Age, mean years (SD)	50.4 (15.9)
Male sex, n (%)	3900 (91.9)
Race, n (%)	
White	1636 (38.5)
Black	228 (5.4)
Unknown	2363 (53.3)
Depression diagnosis, n (%)	1331 (31.4)
Alcohol disorder diagnosis, n (%)	415 (9.8)
Drug disorder diagnosis, n (%)	178 (4.2)
MH visit in past year, n (%)	907 (21.4)
Co-morbidity, mean Charlson score	0.64 (1.01)
Pain diagnosis, n (%)	2104 (49.6)
Back pain	971 (22.9)
Joint or limb pain	1385 (32.6)
Headache	238 (5.6)
Current pain medication, n (%)	1638 (38.6)
Pain score ≥ 4 , n (%)	1689 (39.8)

Table 2: Unadjusted comparison of patients who screened positive for PTSD, with and without coexisting pain

Characteristic	No pain (n =2140)	Pain (n =2104)	P value*
Age, mean years (SD)	52.0 (15.9)	48.8 (15.6)	<0.001
Male sex, n (%)	1984 (92.7)	1916 (91.1)	0.050
Depression diagnosis, n (%)	629 (29.4)	702 (33.4)	0.005
Alcohol disorder diagnosis, n (%)	204 (9.5)	211 (10.0)	0.587
Drug disorder diagnosis, n (%)	83 (3.9)	95 (4.5)	0.301
MH visit in past year, n (%)	443 (20.7)	464 (22.0)	0.283
Charlson co-morbidity index score†			<0.001

0	1205 (56.3)	1361 (64.7)	
1	574 (26.8)	452 (21.5)	
≥2	351 (16.4)	291 (13.8)	

* P value for unadjusted comparison between those with and without pain

† Categorized for ease of interpretation. Range is 0-8... P-value is for continuous score.

Table 3: Outcomes of screening at 3, 6, 9, and 12 months after positive PTSD screen

Month	Received mental health visit, cumulative %(n)	Received PTSD diagnosis, cumulative %(n)
3	44.7 (1842)	22.3 (929)
6	50.3 (2063)	24.5 (1017)
9	53.8 (2194)	26.1 (1074)
12	56.4 (2283)	27.7 (1132)

Table 4: Relationship between pain comorbidity and outcomes of screening

Outcome	HR (95% CI)	P value
Mental health visit	0.889 (0.821, 0.962)	0.004
PTSD diagnosis	0.968 (0.866, 1.082)	0.565

*Adjusted for age, sex, prior mental health visit, depression, alcohol disorder, substance disorder, and Charlson comorbidity score.

APPENDIX